

In re Patent Application of
WINDHAM ET AL.
Serial No. 10/657,959
Filed: SEPTEMBER 9, 2003

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REMARKS

Applicants thank the Examiner for the careful and thorough examination of the present application. By this amendment, independent Claim 9 has been amended to include the features of dependent Claims 10 and 11 which are now canceled. Claims 1-9 and 12-23 remain pending in the application. Favorable reconsideration is respectfully requested.

I. The Invention

As shown in FIGS. 1-4, for example, the invention is directed to a method, mobile node and mobile ad hoc network that supports end-to-end delay reduction, QoS and energy usage leveling. Message data is routed from a source node to a destination node in a mobile ad hoc network (MANET). The MANET has a plurality of intermediate mobile nodes between the source node and the destination node, and a plurality of wireless communication links connecting the nodes together. The method includes prioritizing the message data according to a type-of-service (ToS) and ranking the discovered routes from the source node to the destination node according to quality of service (QoS). In accordance with independent Claims 1, 9 and 16, message data is distributed to the destination node on the discovered routes based upon the ToS of the message data and the QoS or end-to-end delay metric of the discovered routes, including distributing message data having a same ToS on multiple discovered routes, and distributing message data having higher priority ToS. For example, delay sensitive message data and/or large volume message data is distributed on higher ranked discovered routes.

In accordance with independent Claim 9, the method also includes determining whether intermediate mobile nodes on

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routes between the source node and the destination node are service sensitive nodes, and distributing message data to the destination node on the routes based upon the ToS of the message data, the end-to-end delay metric, and the service sensitive node determination.

II. The Claims are Patentable

Claims 1-23 were rejected in view of Sugano et al. (U.S. Patent No. 5,381,404) taken alone or in combination with Naghian et al. (U.S. Patent No. 6,879,574) for the reasons set forth on pages 2-5 of the Office Action. Applicants contend that Claims 1-9 and 12-23 clearly define over the cited references, and in view of the following remarks, favorable reconsideration of the rejections under 35 U.S.C. §102(b) and §103(a) is requested.

As discussed above, the present invention is directed to aspects of a mobile ad hoc network (MANET) where message data is routed from a source node to a destination node. A MANET has a plurality of wireless communication links connecting nodes together. Message data is prioritized according to a type-of-service (ToS).

Independent Claims 1 and 16 include ranking the discovered routes from the source node to the destination node according to quality of service (QoS) while message data is distributed to the destination node on the discovered routes based upon the ToS of the message data and the QoS or end-to-end delay metric of the discovered routes, including distributing message data having a same ToS on multiple discovered routes, and distributing message data having higher priority ToS on higher ranked routes. It is these combinations of features which are not fairly taught or suggested in the

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cited references and which patentably define over the cited references.

The Examiner has relied on the Sugano et al. patent as allegedly disclosing the distribution of message data to the destination node on discovered routes based upon the ToS of the message data and the QoS or end-to-end delay metric of the discovered routes, including distributing message data having a same ToS on multiple discovered routes, and distributing message data having higher priority ToS on higher ranked routes.

The Sugano et al. patent is directed to a communication network and method of design thereof uses end-to-end delay distribution functions and loss probabilities as design constraint to ensure that all packets of all traffic classes on all end-to-end node pairs of the network reach a destination within a predetermined maximum allowable delay with a given probability. An end-to-end delay distribution function is determined for every end-to-end path for all traffic classes to find a path with a minimum distribution probability value. A distribution function is determined for each link of the path having a minimum distribution probability value to determine a most congested link, the capacity of which is increased until a given minimum probability value of distribution is determined. In other words, in the Sugano et al. approach, the capacity of a link is increased based upon the results of the calculation.

Applicants maintain that the Examiner has misinterpreted the cited reference. The Sugano et al. reference is not directed to either an ad hoc or a wireless network at all, as discussed, for example, in column 12 therein. In the Sugano et al. approach, the aspects of end-to-

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end delay distribution functions and loss probabilities regarding all packets of all traffic classes on all end-to-end node pairs of a network is totally unsuited for a network with random and time-varying topology such as a mobile ad hoc network. In mathematics, the calculation of the distribution of any random variable assumes a mathematically stationary process, which is not the case with mobile ad hoc networks.

Importantly, Applicants note that in column 8 of Sugano et al., it is specifically taught that the routing scheme within the network is fixed. "This means that all packets belonging to the same traffic class from source node p to destination node q are routed on a fixed path according to the routing table." In Sugano et al., there is no distributing message data to the destination node on the discovered routes based upon the ToS of the message data and the QoS of the discovered routes, including distributing message data having a same ToS on multiple discovered routes, and distributing message data having higher priority ToS on higher ranked routes as set forth in Claims 1 and 16.

Indeed, in the Sugano et al. process, there is no adjustment of the distribution of the message data onto multiple routes or higher ranked routes, but rather the capacity of a link is increased based upon the results of the calculation.

As the Examiner is aware, a claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference. The identical invention must be shown in as complete detail as is contained in the claim.

The Naghian patent is directed to an architectural approach in which standalone ad-hoc network cells are used as

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an extension of the backbone infrastructure in terms of network architecture or/and its service capabilities is provided. The Examiner relied upon this reference for the teaching of power critical nodes. It is sufficient to point out that nothing in this references makes up for the deficiencies of the Sugano et al. reference as set forth above.

There is simply no teaching or suggestion in the cited references to provide the combination of features as claimed. Accordingly, for at least the reasons given above, Applicants maintain that the cited references do not disclose or fairly suggest the invention as set forth in Claims 1, 9 and 16. Furthermore, no proper modification of the teachings of these references could result in the invention as claimed. Thus, the rejections under 35 U.S.C. §102(b) and §103(a) should be withdrawn.

It is submitted that the independent claims are patentable over the prior art. In view of the patentability of the independent claims, it is submitted that their dependent claims, which recite yet further distinguishing features are also patentable over the cited references for at least the reasons set forth above. Accordingly, these dependent claims require no further discussion herein.

III. Conclusion

In view of the foregoing remarks, it is respectfully submitted that the present application is in condition for allowance. An early notice thereof is earnestly solicited. If, after reviewing this Response, there are any remaining informalities which need to be resolved before the application can be passed to issue, the Examiner is invited and

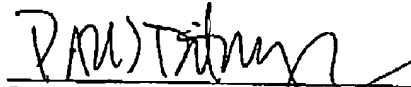
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respectfully requested to contact the undersigned by telephone
to resolve such informalities.

Respectfully submitted,



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CERTIFICATE OF FACSIMILE TRANSMISSION

I HEREBY CERTIFY that the foregoing correspondence has
been forwarded via facsimile number 571-273-8300 to the
Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-
1450 this 3rd day of August, 2006.

